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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

FEB 03 1994

SUBJECT: Request for a Clarification in Scope and Change in Project Ceiling of an Action Memorandum for a Removal Action Palmerton Zinc NPL Site, Palmerton, Carbon County, Pennsylvania

FROM: Terry Stilman, On-Scene Coordinator
Eastern Response Section (3HW31)

TO: Stanley L. Laskowski
Acting Regional Administrator (3RA00)

THRU: Abraham Ferdas, Associate Division Director
for Superfund Programs (3HW02)

I. ISSUE

A removal assessment performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, by the On-Scene Coordinator (OSC) and the Remedial Project Manager (RPM) has identified a threat to human health, welfare, and the environment due to the presence of high levels of heavy metals (lead and cadmium) contamination in surface soil and household dust in residences and residential yards at the Palmerton Zinc National Priorities List (NPL) Site (Site) in Palmerton, Carbon County, Pennsylvania. The OSC has determined that the Site meets the criteria for initiating a Removal Action under Section 300.415 of the NCP. On March 11, 1993, $2,000,000 was approved by the Region to reduce the pathways of exposure to a specific target population due to the high levels of lead and cadmium at the Site. The target population as defined in the March 11, 1993 Request for Funds was defined as children 6 years old and under and/or pregnant women living in households where high levels of site related contaminants were found. The purpose of this Clarification in Scope and Change in Project Ceiling Memorandum is to further detail certain areas in the March 11, 1993 Action Memorandum and to allow for immediate response actions to be taken. As the result of current Site conditions, immediate Removal Action pursuant to Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 USC §9604, is needed.

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841 Chestnut Building
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FEB 03 1994

SUBJECT: Approval of a Clarification of Scope and Change in Project Ceiling of an Action Memorandum for a Removal Action Palmerton Zinc NPL Site Palmerton, Carbon County, Pennsylvania

FROM: Stanley L. Laskowski
Acting Regional Administrator (3RA00)

TO: Elliot Laws, Assistant Administrator
Office of Solid Waste and Emergency Response (OS-100)

THRU: Henry Longest II, Director
Office of Emergency and Remedial Response (OS-200)

ATTN: Deborah Y. Dietrich, Director
Emergency Response Division (5202-G)

ISSUE

The attached CERCLA Clarification of Scope and Change in Ceiling Request pertains to the Palmerton Zinc Site (Site) in Palmerton, Carbon County, Pennsylvania which is on the National Priorities List (NPL). A removal site assessment performed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR Part 300, by the staff in Region III has identified an imminent and substantial threat to public health or welfare or the environment due to the threat of release and current releases of hazardous substances, pollutants or contaminants at the Site. These substances pose the continued threat of an uncontrolled release and potential inhalation and ingestion hazards to any persons living at the Site. This Removal Action is the result of an early action requested by the Remedial Program.

Because the conditions at the Site continue to meet the criteria set forth in the NCP, Section 300.415 for Removal Actions, and Pursuant to Delegation of Authority 14-1-A (giving the Regional Administrator authority to approve CERCLA Removal Actions with a total cost of less than $2 million and completion within twelve months) Region III has approved the use of CERCLA funds in the amount of $1,767,184 to mitigate the threat to public health and the environment, of which $1,615,834 is for Extramural Costs.

Attachment: Clarification of Scope and Change in Project Ceiling

II. BACKGROUND

A. Site Description

The Palmerton Zinc NPL Site is located south of Blue Mountain (on which the Appalachian Trail traverses the crest), and is bordered on the west by Pennsylvania State Route 248 and lands owned by the Appalachian Trail Commission. The New Jersey Zinc Company operated primary zinc smelters located in Palmerton, Pennsylvania between the years 1898 and 1967. Gulf and Western, Inc. (now known as Paramount Industries Inc.) acquired the New Jersey Zinc facility in 1967 and operated the facility until 1981. The facility was acquired by Zinc Corporation of America (ZCA) in 1981. The primary zinc smelters were shut down permanently in 1980. Currently, electric arc furnace dust (EAF), a listed RCRA hazardous waste (K061), is recycled at the Palmerton facility by Zinc Corporation of America, and/or Horsehead Resource Development Company. A residential community borders the facility on the east.

Several investigations have determined that contamination from the operation of the facility has occurred in residential areas adjacent to the facility. The surface soils in these residential areas are contaminated with heavy metals, specifically lead and cadmium. Access in these residential areas is unrestricted. Heavy metal concentrations in soils have been found to exceed 1500 parts per million (ppm) of lead and 100 ppm of cadmium. In addition, similar levels of lead and cadmium contamination have been found in samples of interior dust within homes. These levels have been determined to present an imminent threat to children 6 years old and under and pregnant women (see attached toxicological memo).

B. Site Investigation Background

Due to high levels of lead, cadmium and zinc contamination the Site was placed on the NPL in December 1982. To more efficiently conduct remedial activities, the Site has been divided into four operable units. Operable Unit (OU) #1 consists of the re-vegetation of approximately 2000 acres on Blue Mountain. A Record of Decision (ROD) was issued on September 4, 1987 for OU #1. The selected alternative is to apply a sludge/lime/fly ash mixture with grass seeds and tree seedlings. A Consent Decree to perform the RD/RA between EPA and ZCA, a Division of Horsehead Industries, Inc. (HII) was entered by the U.S. District Court for the Middle District of Pennsylvania on October 18, 1988.

OU #2 consists of remediation of the Cinder Bank. In September 1985, HII and its Division, The New Jersey Zinc Company entered into a Consent Order to conduct a RI/FS for this OU. A ROD was issued on June 29, 1988. OU #4 concerns an area-wide investigation of contamination in the ground and surface waters.

OU #3 concerns offsite soil. A September 1985 Consent Order was signed by Gulf and Western Industries, Inc. to conduct the RI/FS for this OU. The draft RI/FS was completed in 1988 and forwarded to EPA. In February 1991, the Pennsylvania Department of Environmental Resources (PADER) sampled dust in several houses in Palmerton. The results of these samples indicated a high level of lead, cadmium and zinc. EPA conducted additional sampling at 24 homes in Palmerton. The sampling results from the additional 24 homes correlated with PADER results. EPA entered into a Consent Order with HII and its Division, ZCA, to conduct an interior cleanup of the 24 homes. EPA also issued a Unilateral Order to Paramount Communications Inc. to undertake an extent of contamination study to determine the possibility of additional household contamination. The activities performed by HII were completed in the Spring of 1992.

In October 1991, EPA conducted a comprehensive environmental sampling program in conjunction with the Agency for Toxic Substance and Disease Registry (ATSDR) health testing program in Palmerton. Analytical results were received by EPA in October 1992. Those results showed elevated levels of lead, cadmium, and zinc in surface soils and household dust (see attached data summaries). In January and February of 1993, EPA received additional results and reviewed the population make-up in the areas sampled. Based on the sample results and the make-up of the receptor population, the Regional Administrator approved an Action Memorandum on March 11, 1993. The Action Memorandum dealt specifically with the cleanup of homes to eliminate exposure from high levels of lead and cadmium to children 6 years old and younger and/or pregnant women. This action was specifically chosen to protect developing children and fetuses.

This Action Memorandum further explains the basis and cleanup criteria used for the home cleanup action detailed in the March 11, 1993 Action Memorandum, an explanation of the scope of the action, and the estimated cost of the action.

C. Quantities and Types of Substances Present

From the October 1991 sampling (see attached summary sheets), samples taken onsite revealed toxic levels of lead and cadmium.

Lead was detected above health-based levels at the Site. Lead is listed as a probable human carcinogen in EPA health advisory publications and is considered to be a hazardous substance under Section 101(14) of CERCLA and listed as a hazardous substance at 40 C.F.R. § 302.4. Furthermore, lead is a known toxin, particularly harmful to young children, in whom it may cause retarded mental development. The lead levels (up to 30,000 ppm) detected in the surface soils at the Site represent an imminent and substantial threat to human health (See attached toxicological health consultation).

Cadmium is listed as a probable human carcinogen in EPA health advisory publications and is considered to be a hazardous substance under Section 101(14) of CERCLA and listed as a hazardous substance at 40 C.F.R. § 302.4. Furthermore, cadmium is a known toxin and is associated with lung disease caused by chronic bronchitis, obstruction of the lower airways, and tissue damage leading to emphysema. Long term ingestion of cadmium is associated with damage to the kidneys in humans.

D. National Priorities List Status

As stated above, the Site was listed on the National Priority List (NPL) in December, 1982, pursuant to Section 105 of the CERCLA 42 U.S.C. Section 9605, and published in the Federal Register (47 Fed. Reg. 58476) on December 30, 1982. The Site was divided into four operable units and RODs have been signed for two of the operable units. The RPM has requested removal assistance to mitigate immediate threats to human health, welfare, and the environment posed by the presence of high levels of contamination in residential areas.

E. State and Local Authorities' Roles

PADER collected surface dust samples on January 10, 1991, from two residences in the Borough of Palmerton. The laboratory results of these samples indicated lead levels higher than what would normally be expected in non-urban areas.

During the summer of 1992, the Palmerton Environmental Task Force (PETF) was formed. This Task Force consists of representatives of the Local and County governments, the Palmerton Chamber of Commerce, the Palmerton Citizens for a Clean Environment, the Pro-Palmerton Coalition, and several at large members of the community. The purpose of the Task Force is to provide a channel for communication to the community on issues pertaining to the Superfund Site and any potential cleanup. Both EPA and PADER sit on the Task Force as interested parties only.

State and Local authorities have a high degree of interest regarding the Palmerton Zinc Site; however, they do not possess sufficient funds to undertake a cleanup action of the magnitude required at this Site.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

Section 300.415 of the NCP lists the factors to be considered in determining the appropriateness of a Removal Action. Paragraphs (b)(2)(i), (iv), (v), and (vii) of Section 300.415 directly apply as follows to the conditions at the Palmerton Zinc Site:

A. 300.415 (b)(2)(i) "Actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants."

The high levels of lead and cadmium in the soils and household dust exceed EPA's recommended cleanup levels of between 500 ppm to 1000 ppm for lead. The high levels of cadmium (over 100 ppm) also present an imminent risk to human health (see attached toxicological memo). People living in the households where contamination exists in both soil and dust, are subject to continued inhalation and ingestion hazards.

B. 300.415 (b)(2)(iv) "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate"

Surface soils at the Site are heavily contaminated with lead and cadmium. Historically zinc smelter emissions have defoliated the area leaving many bare and sparsely vegetated areas within the Borough of Palmerton. The non-vegetated contaminated surface soil is tracked into residences leading to the existing contaminated house dust.

C. 300.415 (b)(2)(v) "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released"

The contaminated surface soils have poor vegetative cover. At present the soils are exposed to normal weather conditions for the area (wind and rain). The contaminants, given the present soil conditions, are likely to migrate.

D. 300.415 (b)(2)(vii) "The availability of other appropriate federal or state mechanisms to respond to the release"

PADER does not possess the resources at this time to affect the necessary removal response action at the Site.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Actions

The action proposed for the portion of the Palmerton Zinc Site concerning lead and cadmium contamination in homes is designed to eliminate the imminent threat posed to human health, welfare, and the environment by the Site. The proposed action is as follows:

- Based on sampling information gathered and a population audit, determine the exact number of residential areas to be targeted for action by this response. The response action is targeted for those homes indicated above where contamination detected on the property exceeds both 1500 ppm lead and 100 ppm cadmium, and where children 6 years old and younger and/or pregnant women reside or otherwise spend significant time. The OSC will have the flexibility to add or delete homes targeted for this action based on demographic changes that he becomes aware of. Other areas which have lead contamination exceeding 1500 ppm and cadmium in significant quantities will be evaluated for possible response action on a case-by-case basis. The response action will also include day care centers and other common use areas where the target population may be subject to exposure. In addition, residences outside the identified area in the attached maps who have, among other factors, children 6 years old and younger, and whose blood lead levels exceed 10 micrograms per deciliter (ug/dl), may be included after an environmental audit of the residence has been conducted. It is estimated that initially approximately 35 to 45 homes may be affected by this action.

- Implement soil conditioning, rotor-tilling and general vegetative cover amendments (ie. fertilizers and other substances directed to reduce bare areas) to reduce the imminent hazard caused by the exposure of the above mentioned target population to contaminated surficial soils. This action will provide a vegetative (grassy) cover on these highly contaminated properties which will effectively prevent exposure to lead dusts outside and prevent the recontamination of the inside of the homes from outside lead sources until the planned Remedial Action can be implemented. In addition, conduct excavation, down to ARAR levels of contaminated sand and soil where the soil conditioning measures are not appropriate. Excavation is intended to be limited to those

areas of high use by the target population (ie. play areas). Backfill those areas excavated.

- Remove contaminated dust from interiors of homes targeted, and where appropriate, replace contaminated furniture or furnishings. This will reduce to the extent practicable, the amount of lead in the homes.

- Properly dispose of contaminated material (soil, dust, interior furnishings, etc.) produced during the cleanup action.

- Conduct monitoring and sampling of soils and household dust before and after initiation of the response action. In addition, conduct monitoring of blood lead levels of the target population prior to and after the response action.

- Replace to the extent practicable lawns, bushes, trees and other vegetation destroyed during the response action.

- Provide for temporary re-location of residents affected during the response action.

The proposed Removal Action is expected to run less than the statutory 12-month time limit for Removal Actions, barring any unforeseen circumstances or disposal restrictions. The OSC has determined, based on consultation with the Regional Toxicologist, that the threats posed at this Site warrant action within 6 months and that this removal is considered a time critical action as that term is defined in the NCP.

B. Estimated Costs

	Current Ceiling	Proposed Ceiling
Extramural Costs		
Regional Allowance Costs		
ERCS	$1,400,000	$1,099,993
U.S. Coast Guard	---	20,000
Other Extramural Costs Not Funded from Regional Allowance		
20% Contingency	---	223,998
TAT	150,000	61,081
Subtotal	$1,550,000	$1,405,073
20% Project Contingency	310,000	---
15% Project Contingency	---	210,761
Total Extramural	$1,860,000	$1,615,834
Intramural Costs		
EPA Direct Costs	50,000	55,350
EPA Indirect Costs	90,000	96,000
Total Intramural	$140,000	$151,350
TOTAL PROJECT CEILING	$2,000,000	$1,767,184

C. Contribution to Remedial Performance

The purpose of the response action is to eliminate or reduce potential pathways of exposure from the lead and cadmium contamination. This response action is consistent, to the extent practicable, with the overall objectives and recommendations of the RI/FS for OU #3 previously undertaken by Paramount Communications Inc. and additional investigations currently underway by EPA Region III, EPA's National Enforcement Investigations Center (NEIC), and ATSDR, which are to develop alternatives for Site remediation, to identify the source(s) of contamination, and establish the risks associated with the Site contamination. This removal action will assist in containing soil contamination, reducing exposure to

household dust contamination and reducing the qualitative risk associated with continued exposure by the target population to high levels of lead and cadmium.

The proposed activities are consistent with the long-term remedy and are not anticipated to impede future responses.

D. Compliance with ARARs

The proposed Removal Action set forth in this memorandum will comply with applicable or relevant and appropriate environmental and health requirements to the extent practicable considering the exigencies of the situation.

In December 1992, the RPM requested PADER to identify any State ARARs which should be considered in this removal action, but as of yet has not received them for the Site. Federal and State ARARs will be complied with to the extent practicable during all phases of this Removal Action. Additionally the OSC will consider lead cleanup levels identified in the Agency's "Interim Guidance Establishing Soil Lead Cleanup Levels at Superfund Sites" OSWER Directive #9355.4-02, September 7, 1989, that suggests lead cleanup levels for industrial areas at least down to a 1000 ppm average, and for residential areas at least down to a 500 ppm average.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD NO ACTION BE TAKEN OR ACTION DELAYED

If no action is taken or the action is delayed, the direct contact, inhalation and ingestion threats posed by the Site to the target population to high levels of lead and cadmium in the surface soil and household dust will continue. The impact of lead and cadmium on humans is well documented and the exposure to high levels of lead and cadmium poses a serious threat to public health.

VII. ENFORCEMENT

The EPA Region III Enforcement Section has been provided with all background information available to pursue any and all enforcement actions pertaining to the Palmerton Zinc Site. (See attached Confidential Enforcement Memorandum.)

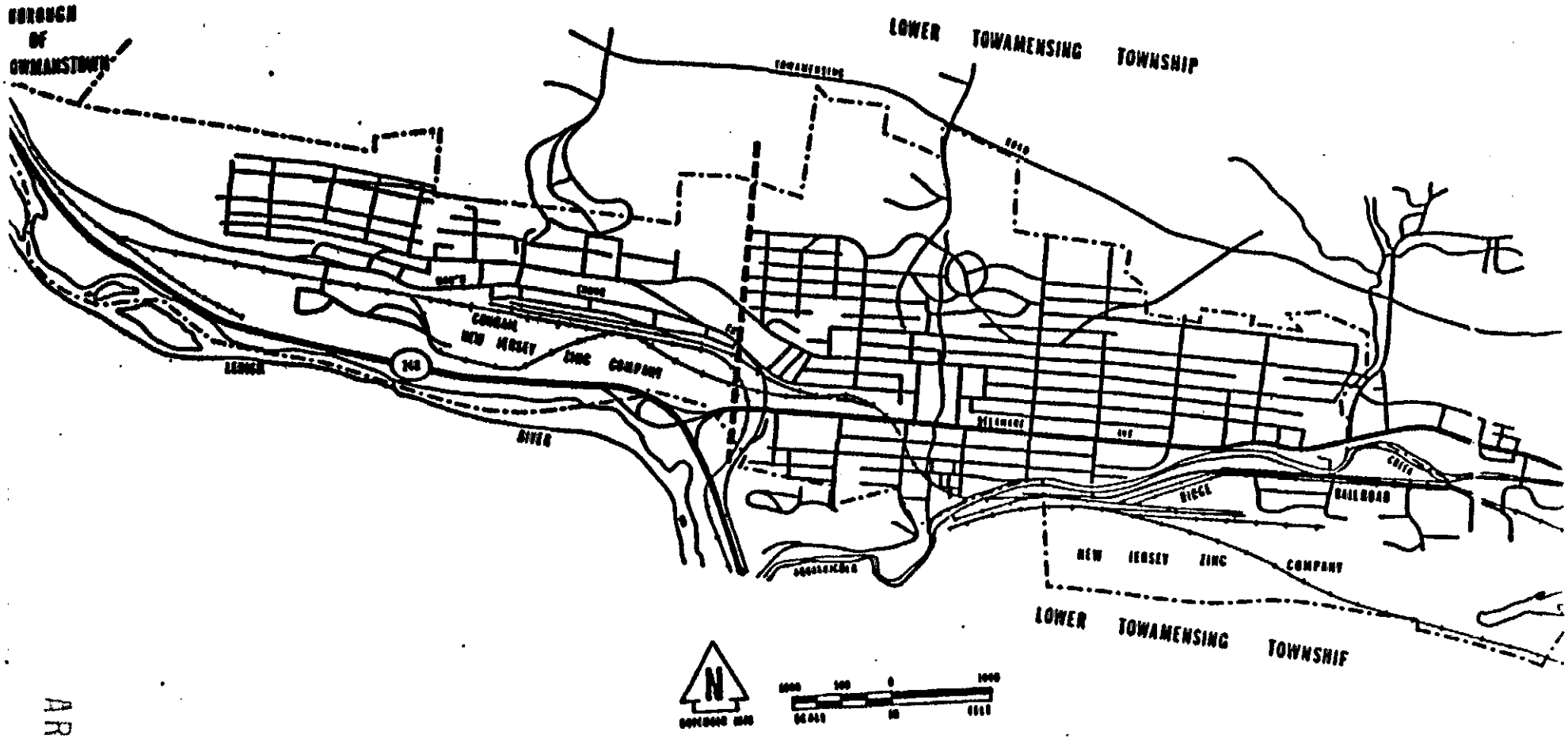
IX. RECOMMENDATION

Because the conditions at the Palmerton Zinc Site meet the NCP Section 300.415 criteria for a Removal Action, I recommend your approval of this Clarification in Scope and Change in Site Ceiling Memorandum to allow for immediate response actions to be taken. Your approval would change the Total Project Ceiling from $2,000,000 to $1,767,184, of which $1,615,834 is for Extramural Costs. You may indicate your approval or disapproval by signing below.

APPROVED: _____ **DATE:** 2-2-94

DISAPPROVED: _____ **DATE:** _____

Six Attachments:
- General Site Layout (Figure 1)
- Average Soil Lead Concentrations Map
- Average Soil Cadmium Concentrations Map
- Interior Dust Lead Concentrations Map
- Interior Dust Cadmium Concentrations Map
- Toxicological Memorandum
- Confidential Enforcement Memorandum



PALMERTON BOROUGH

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ORIGINAL (Red)

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III
841 Chestnut Street
Philadelphia, Pennsylvania 19107

January 31, 1994

SUBJECT: Toxicological consultation for Palmerton Zinc Pile Superfund Site

FROM: Roy L. Smith, Ph.D., Senior Toxicologist
Technical Support Section (3HW13)

TO: Terry Stilman
Eastern Response Section (3HW31)

I have reviewed the house dust and soil data supplied by the Superfund Remedial program. The levels of lead and cadmium in some samples present an imminent threat to human health, as follows:

Lead

The Federal Centers for Disease Control (CDC) have established 10 micrograms of lead per deciliter of blood (μg/dL) as the threshold of concern for lead-induced toxicity in children. CDC's recommendations include triggering community prevention activities at blood lead levels ≥ 10 μg/dL and individual case management (including nutritional and educational interventions, and more frequent screening) at blood lead levels ≥ 15 μg/dL. CDC cited as the basis of its recommendations an "overwhelming and compelling" body of scientific evidence that adverse effects occur in children at blood lead levels at least as low as 10 μg/dL. These effects include significant learning deficits (for example, lower IQ scores) in exposed children when compared with unexposed children. Lead is also readily transferred across the placenta during pregnancy, and children of lead-exposed mothers may have high blood lead levels at birth.

Higher levels of lead exposure can also damage the kidney and nervous system, interfere with hemoglobin synthesis (thereby causing anemia), and cause high blood pressure in adults. EPA has classified lead as a probable human carcinogen, because it causes kidney tumors in test animals.

Children and adults who reside in contaminated areas may be exposed to lead by incidental ingestion of soil and house dust. Adults pick up small amounts of soil and dust on the hands, and ingest it when they eat or smoke. Small children receive higher lead doses from soil and dust for two reasons. Children ingest larger amounts of soil and dust during normal mouthing behavior, and ingested lead reaches a higher concentration in blood because the small size of the child's body allows for less dilution.

Absorption of lead ingested with soil and dust depends on particle size, chemical

species of lead, and concentration. Lead which is dissolved in the GI tract is believed to be more readily taken into the body. Larger soil particles dissolve more slowly, and are less bioavailable. Lead sulfides are less soluble than lead oxides or acetates, so absorption of sulfides is thought to be less. Where lead levels in soil and dust are very high, a smaller percentage of lead appears to be absorbed. Lead at mining sites, where lead sulfide is found in large particles at high concentrations, tends to be less absorbed. Lead absorption efficiency at smelter sites such as Palmerton, which is characterized by somewhat lower concentrations of more soluble lead species in smaller particles, tends to be higher.

EPA has developed the Integrated Exposure, Uptake, Biokinetic (IEUBK) Model to predict potential blood lead concentrations in small children exposed to lead in soil, house dust, air, drinking water, food, and maternal blood (before birth). Although EPA has not calibrated the IEUBK model for the Palmerton site (because individual blood lead data are not available), the model's default assumptions were developed to provide accurate blood lead estimates at sites where smelter emissions were a major lead source. Under these default assumptions, the IEUBK model (v. 0.6) predicts that *ca.* 41% of children aged 6 months to 6 years exposed to soil and house dust lead concentrations of 1500 mg/kg would exceed 10 μg Pb/dL blood, and that 17% would exceed 15 μg/dL. This risk of adverse health effects, developed as a best estimate and not a worst-case scenario, constitutes imminent and substantial endangerment.

The populations currently at risk are children (from birth to age six, inclusive) and pregnant women who reside in homes where bare soil or house dust contains 1500 mg/kg lead or more. Also at risk are children and pregnant women who frequent public areas such as parks or day care centers where bare soil or house dust contains 1500 mg/kg lead or more. The risk to these populations can be reduced by lowering the contact concentration in soil and indoor dust to less than 500 mg/kg (at which less than 5% of exposed children would be likely to have blood lead levels $\geq$ 10 μg/dL). Exposure to contaminated soils may also be reduced by establishing permanent vegetation on contaminated bare areas.

Cadmium

Cadmium, like lead, can be taken into the body from air, soil, house dust, food, and drinking water. It appears to be poorly absorbed through the gut, but absorption efficiency through the lung can be substantially higher, depending on particle size. After absorption, cadmium accumulates in the kidney and the liver.

Absorbed cadmium is rapidly bound to a protein known as metallothionein, produced by the intestine, lungs, liver, and kidneys. Systemic cadmium toxicity, which appears first in the kidney, is thought to be the result of overwhelming metallothionein synthesis. Damage appears to be cumulative over long periods of chronic cadmium exposure. EPA has classified cadmium as a known human carcinogen, based on the association between inhaled cadmium and cancer of the lung and prostate in test animals and humans. Ingested cadmium is not currently thought to be carcinogenic.

Proteinuria is the first symptom of cadmium-induced renal damage, followed by tubular dysfunction and decreased glomerular filtration. A bone disorder, known as Itai-Itai disease, has been described following chronic exposure to cadmium. This disease, which includes osteomalacia and osteoporosis, is likely to be a secondary effect of cadmium toxicity to the kidney and appears to arise from alterations in calcium absorption, thereby altering phosphorous and vitamin D metabolism.

The EPA Office of Research and Development has developed a reference dose of 0.0005 mg/kg/d for oral cadmium intake from food and soil. The reference dose represents EPA's estimate of the highest daily dose of cadmium, with perhaps an order of magnitude of uncertainty, which is expected to be without adverse effect in human populations. Using standard assumptions of residential soil and dust intake by children (but omitting potential cadmium uptake from homegrown vegetables), the reference dose translates to an average cadmium soil concentration of about 40 mg/kg.

Because adverse systemic effects of chronic cadmium exposure appear to be cumulative, short-term exposure to soil and dust concentrations somewhat above 40 mg/kg may constitute substantial, but not imminent, endangerment. However, it is EPA's judgment that exposure of sensitive human subpopulations to soil and interior dust cadmium levels exceeding 100 mg/kg (translating to 2.5 times the reference dose in children) should be terminated as soon as possible.

Sensitive subpopulations whose exposure to cadmium levels $\geq$ 100 mg/kg should be immediately reduced are small children (from birth to 6 years, inclusive) and adults whose urine contains elevated levels of cadmium. Children are considered sensitive because of their low body mass and high soil and dust intake rates; adults with elevated urine cadmium levels are sensitive because it is possible they may already be exhibiting early symptoms of kidney dysfunction. For the Palmerton population, adults having more than 1 μg Cd/g creatinine (the 99th percentile of the control population used for ATSDR's 1993 biological indicators study of the Palmerton population] should be considered to have elevated urine cadmium levels.

Risk to these populations can be reduced by lowering the contact concentration in soil and indoor dust to less than 40 mg/kg, at which most exposed individuals should receive less than the oral reference dose. Exposure to contaminated soils may also be reduced by establishing permanent vegetation on contaminated bare areas.

cc: Fred MacMillan (3HW22)